3.1 TRAFFIC AND CIRCULATION

This section describes the existing traffic and circulation conditions in the transportation study area and identifies the potential traffic, transit, circulation, and parking impacts of each alternative and high-speed train (HST) alignment and station option.

3.1.1 Regulatory Requirements and Methods of Evaluation

A. REGULATORY REQUIREMENTS

The National Environmental Policy Act (NEPA) and California Environmental Quality (CEQA) both require that potential impacts of a proposed project on the traffic, transit, and circulation of the affected area must be examined as part of the EIR/EIS process. Under CEQA, a proposed project should be analyzed for the potential effects listed below (California Department of Transportation 2003).

- An increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in the number of vehicle trips, the volume-to-capacity [V/C][1] ratio on roads, or congestion at intersections).
- Either individually or cumulatively exceeding a level of service (LOS)[2] standard established by the county congestion management agency for designated roads or highways.
- A substantial increase in hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).
- Inadequate parking capacity.
- Inadequate emergency access.
- Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks).
- Rail, waterborne, or air traffic impacts.

V/C ratios and LOS are defined quantitatively in Table 3.1-1.

[1] The *volume-to-capacity (V/C) ratio* is the number of vehicles that travel on a transportation facility divided by the full vehicular capacity of that facility (the number of vehicles the facility was designed to convey).

[2] *Level of service* is a qualitative measure used to describe the condition of traffic flow, ranging from excellent conditions at level of service (LOS) A to overloaded conditions at LOS F. LOS D is typically recognized as an acceptable service level in urban areas. The definition for each level of service for signalized intersections is based on the V/C ratio.

Table 3.1-1
Level of Service and Volume-to-Capacity Ratio Definition

Level of Service	Volume-to-Capacity Ratio	Definition
A	0.000–0.600	EXCELLENT. No vehicle waits longer than one red light and no approach phase is fully used.
B	0.601–0.700	VERY GOOD. An occasional approach phase is fully used; many drivers begin to feel somewhat restricted within groups of vehicles.
C	0.701–0.800	GOOD. Occasionally drivers may have to wait through more than one red light; backups may develop behind turning vehicles.
D	0.801–0.900	FAIR. Delays may be substantial during portions of rush hours, but enough lower volume periods occur to permit clearing of developing lines, preventing excessive backups.
E	0.901–1.000	POOR. Represents the maximum vehicles that intersection approaches can accommodate; may be long lines of waiting vehicles through several signal cycles.
F	>1.000	FAILURE. Backups from nearby locations or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches. Tremendous delays with continuously increasing queue lengths.
Source: Transportation Research Board 1980.		

Given the scale of the proposed high-speed rail system, virtually all of the criteria mentioned above would be potentially affected by the No Project, Modal, and HST Alternatives. For this analysis, this program-level document focused on the criteria below.

- Traffic and LOS analysis of the following elements.
  - Intercity highway segments.
  - Primary highways/roadways accessing proposed HST stations.
  - Primary highways/roadways accessing airports.
- Potential impacts on transit, goods movement, and parking for each of the regional corridors and proposed stations and airports.

B. METHOD OF EVALUATION OF IMPACTS

The traffic, transit, circulation, and parking analyses for this Program EIR/EIS focused on a broad comparison of potential impacts on traffic, transit, circulation, and parking along stations and around corridors for the Modal and HST Alternatives. The potential impacts for each of these alternatives were compared to the No Project Alternative.

Highway, roadways, passenger transportation services (e.g., bus, rail, air, intermodal, and transit facilities), goods movements, and parking issues were evaluated in this analysis. Transportation facilities, highways, and roadways included in the analysis serve as the primary means of existing (or planned future) access to proposed rail stations and airports. In addition, these facilities are within 1 mile (mi) (1.6 kilometers [km]) of the proposed suburban rail stations, 0.25 mi (0.40 km) of proposed downtown stations, or 1 mi (1.6 km) of airports, or are key capacity constraint points on major routes along intercity corridors.

Initial analysis included identifying primary routes to be considered, with highways designated in the No Project and Modal Alternatives, and all modes of access to the stations and airport areas in the Modal and HST Alternatives, respectively. The primary routes and modes of access for the stations and airports considered assumptions for distribution of trips by direction.

Once primary routes were identified, screenlines or cordons combining segments of the primary routes that reasonably represent locations for evaluating the aggregate baseline traffic and public passenger transportation conditions (using data for 2002, 2020, or other similar years as available) in the a.m. peak hour were selected. The use of screenlines or cordons is necessitated by the scale of this analysis with its requirement to evaluate roadway conditions throughout the state. A more detailed analytical framework must necessarily be reserved for future analyses of individual projects.

Screenlines, especially on intercity highway links, have been selected to represent typical morning peak-hour conditions. The data used in the evaluation of traffic volumes and capacities at the screenlines therefore are typical values based on averages over time and represented in traffic forecasting tools used by the regional transportation planning agencies. As such, the conditions indicated in the evaluation may not always reflect the experiences of travelers at any particular place at any specific time. For example, localized capacity restrictions (e.g., bottlenecks at a given interchange) are not well represented in those regional traffic models. In addition, incidents on the road such as accidents and vehicle breakdowns (non-recurring congestion) are not represented in regional traffic models. This unpredictable type of incident is responsible for the majority of congestion in urban highway networks. The result of these limitations of the methodology and data used in this analysis is that many times the level of service or average speed shown in the evaluation may be more optimistic than what would actually be experienced on the roadway under the forecasted conditions. Thus, it is important to consider the differences between the alternatives compared rather than focus on the absolute value of the indicators (i.e., V/C or LOS).

Baseline conditions were defined using the methodology below.

- Intercity Screenlines—Baseline conditions (2002, 2020) were established for intercity highway segments based on available counts of existing weekday morning peak-hour traffic volumes and projected annual growth rates. This process involved a comparison of existing V/C to determine LOS at link level.
- Station and Airport Cordons—Baseline (2002 and 2020 data, as available) ratios of demand to capacity across each cordon for roadways (not intersections) were established for the weekday morning peak hour using *2000 HCM* standards for capacity. (Transportation Research Board 2000.)
- Transit Access—Baseline conditions were established through an inventory of available public transportation services at and adjacent to the stations and airports.
- Goods Movement—Baseline conditions (2002, 2020) for goods movement (truck freight) weekday morning peak hour for locations in the area were identified as critical by regional goods movement studies.
- Parking near Stations and Airports—Descriptions of parking conditions are based on 2002 parking reserves, local plans for major parking expansion, and adequacy of local parking codes for meeting No Project growth in demand.

Trip generation was calculated based on the forecasted 2020 demand for high-speed rail and airports and highways improved under the Modal Alternative, the local trips in 2020 generated by project-related development (as data are available), and the additional trips due to induced growth. The generated trips were added to the appropriate baseline volumes and distributed to the identified screenlines or cordons (roadway and public transportation). Next, the generated trips were

distributed on selected segments/links on primary regional routes and modes of access to stations and similar facilities at a screenline level. Specific aspects of the methodology for this process are detailed below.

- For each screenline or cordon, new ratios of demand-to-capacity were calculated. *Demand* is the baseline volumes plus additional trip generation by the Modal or HST Alternatives.
- Future No Project link capacity conditions were established through available plans from local and regional agencies, and based on the fiscally constrained element of the relevant regional transportation plan (RTP).
- For the Modal Alternative, assumed 2020 capacity is the baseline capacity plus any improvements included in the fiscally unconstrained element of the RTP needed to mitigate potential V/C impacts. In some instances, further roadway widenings (i.e., beyond even the fiscally unconstrained RTP projects) were needed to provide capacity sufficient to meet projected traffic.
- Link-level analysis of impacts was performed to roadways for weekday morning peak-hour conditions. Capacity levels were based on the *2000 HCM* methodologies.
- Future roadway V/C on selected segments compared future volumes with/without alternatives with future capacity determined. Future V/C with/without the alternatives was analyzed. This assessment was performed at a cordon level, aggregating the V/C on all major facilities accessing the stations or airports.
- Cordon-level analysis was also performed for public transportation services serving the stations or airports, based on weekday morning peak-hour service headway and capacity conditions.
- Impacts were determined by comparing future load factors or service headway requirements with existing levels, No Project levels (as specified in relevant RTPs), and levels demanded by the Modal and HST Alternatives.
- Goods movement impacts were determined through an assessment of the net impact of project alternatives on the corridor.

Summary tables for the regions were then completed that identified impacts on highways/roadways (at screenline), public transportation services, goods movement, and parking facilities. The impacts are described and ranked as high, medium, or low in the summary tables in the appendix for this section, according to the potential extent of change to traffic, transit, circulation, and parking and described in terms of LOS A to LOS F for traffic impacts.

The final step included the identification of mitigation strategies for avoidance of potential impacts related to traffic, circulation, and parking. Most mitigation measures involve subsequent analysis of traffic, circulation, or parking in the next phase of work.

3.1.2 Affected Environment

A. STUDY AREA DEFINED

The transportation study area is defined as the primary highways and roadways that: 1) serve as the primary means of access to proposed rail stations and airport facilities, as well as the highway/roadway improvements and new facilities proposed under the Modal Alternative; and 2) are within 1.0 mi (1.6 km) of proposed rail stations and, for the Modal Alternative, airports and major routes along alignments or highway corridors.

B. GENERAL DISCUSSION OF TRAFFIC AND CIRCULATION

This analysis only considers the primary highways and roadways that serve the transportation study area. Although this level of analysis is appropriate for a program-level environmental document, variations in traffic conditions on smaller transportation facilities such as arterials and roadways are not included in the study area. Many of these smaller facilities are currently congested, and their operation is projected to worsen under the No Project Alternative. Operation on these facilities could indirectly benefit from implementation of the Modal or HST Alternative. The capacity improvements of the Modal Alternative could keep long-distance trips off local roads, while the HST Alternative could reduce demand such that long-distance trips would not be forced onto local streets. The potential impact of the proposed Modal and HST system on these smaller facilities would be examined as part of any subsequent and more detailed project-level environmental analyses.

Currently, the study area highway and roadway corridors considered in this analysis represent some of the worst traffic conditions in the nation. Highways are heavily congested during both the morning and evening peak hours in and around urban centers such as San Francisco, Sacramento, Los Angeles, and San Diego. Although the peak periods have a shorter duration, congestion affects many traditional rural and suburban communities in the Central Valley. This congestion is caused mostly by regional and urban commute traffic. Commute trips (to and from work) make up the majority of highway trips during the peak periods; the intercity trips considered in this analysis represent only a small proportion of highway traffic. The Southern California Association of Governments (SCAG) has estimated that, during morning peak-hour traffic in some of the most congested corridors in southern California, the average speed is less than 20 miles per hour (mph) (32 kilometers per hour [kph]) in the congested direction. In 2002, traffic congestion cost motorists in California $20.4 billion annually in lost time and fuel. Los Angeles and the San Francisco-Oakland area were rated as the nation's two most congested regions, and 6 out of the 25 most congested urban regions were in California (Texas Transportation Institute 2003).

Traffic conditions throughout northern and southern California are expected to worsen, and only limited improvements to transportation facilities are funded and programmed for implementation by 2020. Steadily increasing regional and urban traffic affects intercity commutes by delaying travelers where capacity is constrained. For example, according to the *Bay Area Regional Transportation Plan* (Metropolitan Transportation Commission 1999), regional travel (i.e., travel between different regions) within the Bay Area is expected to grow by 46%, and intraregional travel (i.e., travel within a region) is projected to grow by 115% by 2020. Intercity travel that competes with regional and intraregional travel for use of the same facilities is directly affected by these conditions. For instance, an intercity trip between Los Angeles and San Francisco is likely to be affected by congestion in the heavily traveled regional and intraregional travel corridors in southern and northern California, and in certain segments of the Central Valley.

C. TRAFFIC AND CIRCULATION RESOURCES BY REGION

The following section briefly describes the transportation facilities, highways, and roadways in each of the five regions analyzed.

Bay Area to Merced

This region includes central California from the San Francisco Bay Area (San Francisco and Oakland) south to the Santa Clara Valley and east across the Diablo Range to the Central Valley. The primary airports in the Bay Area are San Francisco International (SFO), Oakland Metropolitan International (OAK), and Norman Y. Mineta San Jose International (SJC). As defined in Chapter 2, *Alternatives*, only OAK and SJC were considered for airport-related improvements under the Modal Alternative. The primary north-south highways in the Bay Area are US-101 and I-280 on the Peninsula, and I-880 and I-680 in the East Bay. I-80 links San Francisco and Oakland via the

Bay Bridge and continues to Sacramento. I-580 and SR-152 provide access to I-5 in the Central Valley. I-380 and SR-87 provide east-west access on the San Francisco peninsula to SFO and SJC, respectively. In the Bay Area to Merced Region, US-101, I-880, I-80, I-580, and SR-152 would undergo improvements under the Modal Alternative.

Sacramento to Bakersfield

This region of central California includes a large portion of the Central Valley (San Joaquin Valley) from Sacramento south to Bakersfield. Six airports were considered in the analysis of the Modal Alternative: Sacramento International Airport (SMF), Modesto City-County Harry Sham Field (MOD), Merced Municipal/Macready Field (MCE), Fresno Yosemite International Airport (FAT), Visalia Municipal Airport (VIS), and Bakersfield Meadows Field Airport (BFL). The Stockton Airport was not considered because of constraints that make airport expansion infeasible. Only SMF was considered for airport-related improvements. Key intercity highways in the Sacramento to Bakersfield region include I-5, SR-99, and I-80 west of Sacramento. In the Sacramento to Bakersfield region, I-5 and SR-99 would undergo improvements under the Modal Alternative.

Bakersfield to Los Angeles

This region of southern California encompasses the southern portion of the Central Valley south of Bakersfield, the mountainous areas between the Central Valley and the Los Angeles basin, and the northern portion of the Los Angeles basin from Sylmar to downtown Los Angeles. The Burbank-Glendale-Pasadena Airport (BUR) site was considered in the analysis of the Modal Alternative. I-5 is the primary highway link between southern California and northern California and the San Joaquin Valley. SR-14, on the west side of the San Gabriel Mountains, is the primary link between Antelope Valley, eastern California, and Los Angeles. In the Bakersfield to Los Angeles region I-5, SR-58, and SR-14 would undergo improvements under the Modal Alternative.

Los Angeles to San Diego via Inland Empire

This region of southern California includes the eastern portion of the Los Angeles basin from downtown Los Angeles east to the Riverside and San Bernardino areas and south to San Diego generally along the I-215 and I-15 corridors. The Ontario International Airport (ONT) and San Diego International-Lindbergh Field (SAN) are the only airports potentially affected by the Modal Alternative in this region. The intercity highways in Los Angeles and Riverside Counties that could be affected by the Modal Alternative are I-10 and I-215. In San Diego County, potentially affected highways are I-15 and SR-163. In the Los Angeles to San Diego via Inland Empire region, I-10, I-15, I-215, and SR-163 would undergo improvements under the Modal Alternative.

Los Angeles to San Diego via Orange County

This region includes the western portion of the Los Angeles basin between downtown Los Angeles and Los Angeles International Airport (LAX) and the coastal areas of southern California between Los Angeles and San Diego, generally following the existing Los Angeles to San Diego via Orange County (LOSSAN) rail corridor. In the LOSSAN region, I-5 and I-8 would undergo improvements under the Modal Alternative.

LAX and Long Beach Municipal Daugherty Field (LGB) are the only major commercial airports that were considered in the analysis of the Modal Alternative for the LOSSAN region. John Wayne International-Orange County Airport (SNA) in Orange County was not considered in the analysis because of constraints that make airport expansion infeasible.

A limited number of intercity highways in the region connect the three metropolitan areas of Los Angeles, Orange, and San Diego Counties. I-5 has been identified as the primary route between Los Angeles Union Station (LAUS) and San Diego. I-110 and I-105 were identified as the most direct highway links between LAUS and LAX.

3.1.3 Environmental Consequences

A. EXISTING CONDITIONS COMPARED TO NO PROJECT ALTERNATIVE

The existing condition is the transportation infrastructure that exists in 2003 and its associated levels of service. The No Project Alternative includes the existing infrastructure, plus the implementation of funded and programmed transportation improvements that will be operational by 2020 and the projected level or service of that infrastructure in 2020. Impacts on intercity highways are analyzed in terms of V/C ratio, corresponding LOS, and average highway speed. Impacts on transit, goods movement, and parking are harder to quantify but include potential impacts such as full parking lots at stations, and are assigned a low, medium, or high rating corresponding to the estimated level of potential impact.

In general, traffic conditions throughout the study area are poor in terms of congestion levels (e.g., travel delays), particularly during the peak periods. According to nationwide studies conducted by the Texas Transportation Institute, urban areas of San Francisco and Los Angeles experience some of the highest congestion levels in the country (Texas Transportation Institute 2002). Under the No Project Alternative in all regions, existing traffic conditions are projected to deteriorate on highway segments, around airports, and near the proposed HST stations in the study area. As shown in Figures 3.1-1 and 3.1-2, all of the 68 intercity highway segments analyzed, except I-580, would have a high V/C ratio under the No Project Alternative. Traffic congestion is projected to increase because travel is expected to increase by 2 to 3% per year in many areas. The No Project Alternative does not provide infrastructure improvements sufficient to address the projected growth in highway travel and the exponential increase of commute trips to both the traditional urban areas (i.e., the San Francisco Bay Area and Los Angeles basin) and the emerging urban areas in the Central Valley. In most cases, the potential impact would manifest itself as deteriorating LOS on highway segments and local streets or extended peak-period congestion on highways that already operate at LOS F (i.e., the morning peak period would extend from two hours to four hours). As summarized in Table 3.1-2, V/C ratios are projected to deteriorate by 38.4% on average across all five regions, and each region would have more LOS F segments under the No Project Alternative compared to existing conditions. The average V/C ratio would also deteriorate significantly (38.4%), which would result in more severe congestion and peak periods that last longer under the No Project Alternative compared to existing conditions.

Table 3.1-2
Summary of Existing and No Project Conditions

Intercity Highway Segments Number Operating at V/C greater than 1.0 or LOS F				
Region	**Number Analyzed**	**Existing Condition**	**No Project Condition**	**Average Change in V/C from Existing**
Bay Area to Merced	14	12	12	5%
Sacramento to Bakersfield	22	2	8	52%
Bakersfield to Los Angeles	10	5	7	73%
Los Angeles to San Diego via Inland Empire	12	7	11	43%
Los Angeles to San Diego via Orange County	10	9	8	19%
Total	68	35	38	
Average				38.4%
Source: Parsons Brinckerhoff 2003.				

Exceptions to these projected worsening conditions are expected to occur in areas where planned highway improvements will be implemented and operational by 2020. There are only a handful of segments projected to improve between existing conditions and the No Project condition, and the projected improvements would not cause a general improvement or stabilization of conditions across the study area. Those segments that do improve are expected to eventually worsen over time as their capacity is filled by new trips attracted to the less-congested facilities.

Summary descriptions of the existing and No Project Alternative traffic, transit, circulation, and parking conditions by region are provided below. Traffic and circulation in proposed HST station areas are analyzed for the No Project Alternative, but the stations would be implemented only under the HST Alternative. For a more detailed discussion of traffic data in the five regions under existing, No Project, and the proposed Modal and HST Alternatives, see Appendix 3.1-A.

Bay Area to Merced

Intercity Highway Segments: After a decade of rapid job growth in the Bay Area, most freeway segments in the study corridors of I-80, US-101, I-880, I-580, and SR-152 are very congested, operating at LOS F in the morning peak hour in the peak direction. V/C ratios are expected to worsen on most segments under the No Project Alternative. Conditions are expected to improve only on I-880 north of San Jose and on US-101 south of San Jose, where planned highway improvements are to be implemented and operational by 2020. Overall, traffic congestion is projected to worsen because travel rates (or the number of trips taken) are increasing by 2 to 3% per year at the gateways to the Bay Area. Commute trips into the Bay Area are expected to increase by 233% between 1990 and 2020.

Proposed High-Speed Train Stations: Roadways in the study area near most of the station areas would have worse LOS under the No Project Alternative than under existing conditions. It is estimated that that LOS in 11 of the 15 station areas would deteriorate. The Millbrae Station area would show the most notable drop in LOS between 2002 and 2020 (dropping from LOS C to LOS E).

Airports: Areas within the screenlines around the San Francisco, Oakland, and San Jose airports are very congested under existing conditions, with LOS F in the peak direction of the morning peak hour. Conditions are projected to deteriorate under the No Project Alternative.

Transit, Goods Movement, and Parking: Generally, public transit and goods movement are operating under congested conditions and are not projected to change under the No Project Alternative. The only exception would be US-101 south of San Jose, where planned highway improvements would improve truck operating conditions by 2020.

Even though there is sufficient parking planned for the HST stations, one of the greatest effects that HST could have on the existing transit system would be the potential use of existing transit parking facilities by HST passengers. At all Caltrain stations other than the Millbrae Station, and at affected San Francisco Bay Area Rapid Transit District (BART) stations such as West Oakland, 12th Street, Coliseum, and Union City in the East Bay, there is sufficient parking under existing conditions. In downtown San Francisco and Oakland, as well as at the three major airports, there currently is no excess parking. Parking conditions at these locations are expected to remain the same or improve under the No Project Alternative because Caltrain and BART capital expansion programs include parking expansions and the programs are likely to continue to adjust to market demands. However, HST riders could potentially use existing transit parking facilities, resulting in parking impacts.

Sacramento to Bakersfield

Intercity Highway Segments: Under existing conditions, 4 of the 22 locations analyzed are operating at LOS E or F, while the remaining 18 locations are operating at LOS D or better. The four locations first mentioned are I-80 at the Yolo Causeway, I-5 between Hodd Franklin Road and Elk Grove Boulevard, SR-99 between Mack Road and Florin Road, and SR-99 between Collier Road and the San Joaquin/Stanislaus County line. These four worst locations are operating near capacity (V/C 0.93 or more) or over capacity (V/C 1.0 or more) along key intercity highway segments. Traffic congestion is projected to worsen on all except one of the key intercity highway segments under the No Project Alternative, even with planned highway widenings. The one exception is on I-80 at the Yolo Causeway, where planned widening of the freeway is expected to slightly improve the V/C ratio, although LOS will remain LOS F. Under the No Project Alternative, the number of locations operating at LOS E or F would increase to nine, compared to four under existing conditions. Although the remaining 13 locations would operate at LOS D or better, LOS at several of these locations would degrade by two or more ranks (e.g., from LOS B to LOS D). These locations are summarized in Table 3.1-3.

Table 3.1-3
Summary of Locations Degrading by Two or More Levels of Service under Existing and No Project Alternative Conditions
Sacramento to Bakersfield Region

	Existing Conditions		No Project Alternative	
Intercity Highway Segments	**V/C**	**LOS**	**V/C**	**LOS**
I-5 north of J-11 (County Road) to Sacramento/San Joaquin County line	0.74	C	1.30	F
I-5 south of I-580	0.59	A	0.96	E
I-5 between Button Willow Rowlee and Lerdo Highway	0.43	A	0.78	C
SR-99 between Collier Road and Liberty Road	0.65	B	1.01	F
SR-99 between Hammett Road and San Joaquin/Stanislaus County line	0.82	D	1.57	F
SR-99 south of Mitchell Road	0.68	B	0.84	D
SR-99 between Adams Avenue and Clovis Avenue	0.66	B	1.03	F
SR-99 north of 7th Standard Road	0.50	A	0.74	C
SR 99 between SR-119 and Houghton Road	0.35	A	0.73	C
Source: Parsons Brinckerhoff 2003.				

Airports: Under the No Project Alternative, traffic congestion is projected to worsen at the major roadways that provide access to the Sacramento and Bakersfield Airport areas. Parking should be sufficient at the airports.

Transit, Goods Movement, and Parking: No change is projected for public transit and parking conditions under the No Project Alternative. The No Project Alternative could result in some impact on goods movement because demand would increase, but limited infrastructure improvements would be implemented.

Compared to existing conditions, no significant impacts on goods movement or parking are anticipated to occur at any of the analyzed locations under the No Project Alternative.

Bakersfield to Los Angeles

Intercity Highway Segments: The I-5 corridor is a critical transportation facility in this region and serves as the primary highway link between southern and northern California for the movement of private automobiles and trucks carrying goods. According to the California Highway Patrol (CHP), travelers on the Grapevine section of I-5 (between Gorman and Santa Clarita) experience severe weather conditions during the winter. During these severe conditions, CHP closes the Grapevine to all traffic. CHP does not record the number of closures per year, but, in general, the segment can be closed between two and eight times per year, depending on the frequency and severity of snow and ice conditions. Of the ten locations analyzed in this region, five are currently operating with severe traffic congestion (LOS F); all five of these locations are on the I-5 corridor. There are no significant capacity improvements programmed or funded for 2020 on the I-5 corridor. Therefore, under the No Project Alternative, traffic conditions are projected to worsen considerably on all of the key intercity highway segments, with eight of the ten analyzed locations projected to operate at LOS E or F. The remaining two segments (I-5 at Gorman and SR-14 Palmdale) would continue to operate at LOS A. The most notable projected LOS degradations under No Project would occur at locations listed below.

- I-5 north of SR-14 in Santa Clarita, expected to worsen from LOS C to LOS F.
- SR-14 north of Avenue P in Palmdale, expected to worsen from LOS A to LOS E.
- SR-14 north of I-5 in Santa Clarita, expected to worsen from LOS D to LOS F.

Proposed High-Speed Train Stations: Traffic conditions near all proposed HST stations are operating between LOS B and LOS E under existing conditions; however, they would all degrade to LOS F under the No Project Alternative. The most notable degradations would occur at the proposed Palmdale (LOS C to LOS F), Sylmar (LOS B to LOS F), and Burbank Downtown Station sites (LOS C to LOS F).

Airports: Under the No Project Alternative, traffic congestion would increase at the major roadways that provide access to the Burbank Airport area.

Transit, Goods Movement, and Parking: No change is projected for transit and parking conditions under the No Project Alternative. The overall potential impact on goods movement of the No Project Alternative is low.

Los Angeles to San Diego via Inland Empire

Intercity Highway Segments: Under existing conditions, the average speed on some of the region's most congested corridors is estimated to be less than 20 mph (32 kph) in the congested direction. Additionally, congestion delay is projected to increase by 100%, (Southern California Association of Governments 2003) and traffic congestion is projected to worsen on all of the key intercity highway segments, with 11 of the 12 locations analyzed projected to operate at LOS F. The most notable LOS degradations under the No Project Alternative are projected to occur at the locations listed below.

- I-15 between I-10 and I-215, expected to worsen from LOS B to LOS F.
- I-215 between I-10 and Riverside, expected to worsen from LOS A to LOS F.
- I-215 between I-15 and Temecula, expected to worsen from LOS A to LOS C.
- I-15 between Temecula and Escondido, expected to worsen from LOS B to LOS F.

Proposed High-Speed Train Stations: Traffic conditions are expected to worsen at the proposed HST station areas, with the exception of four station areas where funded roadway improvements

will occur under the No Project Alternative. These locations include the Escondido Rock Springs Station site (V/C ratio would improve from 0.72 to 0.55, LOS C would improve to LOS A), Mira Mesa Station site (0.73 to 0.71, LOS C under both conditions), Qualcomm Station site (1.17 to 0.68, LOS F to LOS B), and University Towne Centre station site (0.62 to 0.50, LOS B to LOS A).

Airports: Under the No Project Alternative, traffic congestion is projected to increase at the major roadways that provide access to the San Diego International Airport area, and traffic conditions at the Ontario International Airport are projected to improve because of roadway improvements.

Transit, Goods Movement, and Parking: No change is projected for transit and parking conditions under the No Project Alternative. Under No Project, potential impacts on goods movement would vary between low at locations such as March Air Reserve Base (ARB), Temecula, and Mira Mesa, and high at the proposed El Monte and San Bernardino HST station areas, based on observed truck volumes and surrounding land uses at these sites.

Los Angeles to San Diego via Orange County

Intercity Highway Segments: Under existing conditions, nine of the ten locations analyzed are operating at LOS F, and the remaining location (I-5 at SR-55) is operating at LOS E with a V/C ratio of 0.96, approaching LOS F (V/C of 1.0 or more). These conditions are not expected to improve under the No Project Alternative; on average, V/C ratios are projected to increase by 12% at these locations, reflecting more severe congestion and longer congested peak periods. There are two exceptions to this projected condition under the No Project Alternative: significant freeway and transit system expansions are planned along I-5 to Tamarack Avenue and along I-5 to Via De La Valle. These expansions will improve the existing LOS F condition to LOS D and E, respectively.

Proposed High-Speed Train Stations: Traffic conditions are expected to worsen at the proposed HST station sites, with the exception of four stations, where funded roadway improvements will result in improved conditions under the No Project Alternative. The proposed station sites where improvements are expected are Norwalk Station (V/C ratio would improve from 0.71 to 0.70, LOS C under both conditions), Fullerton Transit Center Station (0.84 to 0.77, LOS D to LOS C), Anaheim Transit Center Station (0.55 to 0.50, LOS A under both conditions), and University Towne Centre Station (0.68 to 0.65, LOS B under both conditions).

Airports: Under the No Project Alternative, traffic congestion would increase at the major roadways that provide access to LAX and Long Beach Airport.

Transit, Goods Movement, and Parking: Based on the existing number of transit routes, frequencies, and span of service, no significant impact on public transit services is projected (including service to LAX) if no significant improvements to existing public transit service were provided under No Project.

Most delay impacts on goods movement would occur in Los Angeles County and north Orange County, where heavy freight received at the Ports of Los Angeles and Long Beach exits the region en route to destinations throughout the nation. Potential negative impacts on goods movement in south Orange County are projected to occur because the higher vehicular traffic on I-5, which is forecast under the No Project Alternative, would not be met by a corresponding increase in the capacity of transportation facilities.

With the exception of the proposed Norwalk and Irvine Stations, no parking impacts are projected under the No Project Alternative. The Norwalk (LOSSAN) Station is projected to have

medium parking impacts, and the Irvine Station is projected to have high parking impacts, because there is little land around the station areas that can be developed to meet the projected parking demand.

B. NO PROJECT ALTERNATIVE COMPARED TO MODAL AND HIGH-SPEED TRAIN ALTERNATIVES

The No Project Alternative represents the future baseline condition. It is assumed that any improvements associated with the proposed Modal or HST Alternatives would be in addition to the No Project condition. For this comparison, it is assumed that the Modal Alternative accommodates the same intercity demand, for either automobile or airplane trips, as the HST Alternative demand. It is projected that improvements associated with the proposed Modal Alternative would increase the capacity of highways (by adding traffic lanes) and airports (by adding runways and gates) to better accommodate demand compared to the No Project Alternative, and would result in improved levels of service and reduced congestion on those facilities.

As shown in Figures 3.1-3 through 3.1-6, both the proposed Modal and HST Alternatives would improve traffic at the intercity screenlines compared to the No Project Alternative. Long-term potential impacts related to the No Project Alternative would potentially be alleviated by the Modal Alternative through the addition of lane miles and airport capacity, and they would potentially be alleviated by the HST Alternative through the diversion of automobile and airplane trips to the HST. As summarized in Table 3.1-4, for the five regions the average V/C ratio improvement is anticipated to be between 14% and 33% under the Modal Alternative, and between 1% and 9% under the HST Alternative. The differences among the regions are directly related to the volume of demand. For instance, in the Sacramento to Bakersfield region under the Modal Alternative, there would be 0.70 intercity and commute (total) peak-hour trips per lane mile, a peak-hour volume of about 2,790 total highway trips over about 4,070 lane mi (6,550 km) compared to the other regions, where there would be between 2.5 (Bay Area to Merced region) and 8.1 (Bakersfield to Los Angeles region) total peak-hour trips per lane mile. Therefore, segments with less demand would experience greater changes in LOS with the proposed improvements compared to regions with higher demand. This result is illustrated by the Sacramento to Bakersfield region where, under the Modal Alternative, a 33% improvement in V/C ratio is projected, compared to a 14% to 21% change in other regions. The 14% to 33% improvement under the Modal Alternative would result from the significant improvement to highway capacity represented by 2,970 additional lane mi (4,779 km). Under the HST Alternative, 1% to 9% improvement is projected to occur, resulting from the diversion of 34 million highway trips to the HST. (No additional lane miles are included with this alternative.)

Table 3.1-4
Summary of No Project Conditions Compared to Modal and HST Alternatives

Region	Intercity Highway Segment Averages				
	NP	Modal Alternative		HST Alternative	
	V/C	V/C	% Change from NP	V/C	% Change from NP
Bay Area to Merced	1.22	0.96	21%	1.14	7%
Sacramento to Bakersfield	0.92	0.62	33%	0.89	4%
Bakersfield to Los Angeles	1.67	1.38	14%	1.67	1%
Los Angeles to San Diego via Inland Empire	1.40	1.15	19%	1.29	9%
Los Angeles to San Diego via Orange County	1.35	1.11	16%	1.31	3%
Average	1.31	1.04	21%	1.26	5%

NP = No Project Alternative.
Source: Parsons Brinckerhoff 2003.

In addition to adding capacity in discrete amounts to roadways and airports throughout the state, the Modal Alternative would provide capacity in excess of what is needed for projected intercity automobile or airplane trips, because in most cases the capacity added as part of the Modal Alternative is more than the marginal representative demand. Since highway lanes are not scaleable (i.e., it is not possible to build 25% or 50% of a highway lane to meet a 25% or 50% increase in traffic demand), most lanes added as part of the Modal Alternative have excess capacity. The traveling public is likely to respond to this new excess capacity by using the improved facilities for all trips, not just intercity trips. For example, on roadways where capacity is added, traffic congestion may well be eased, making a particular roadway a more attractive route for travel. New traffic would not necessarily be intercity traffic only, but could include shorter trips within a region. An analogous situation at airports would be one in which transcontinental or international flights make use of capacity that was added to meet intercity demand. In the case of both roadways and airports, as the forecast intercity demand is met, intercity travelers may compete for capacity with non-intercity travelers in the air and on the road. This phenomenon cannot be evaluated quantitatively at this programmatic level of analysis. Therefore, the current assessment of the Modal Alternative is possibly portraying the consequences of adding capacity to roadways and airports in terms of congestion, speeds, and level of service more optimistically and thus more favorably then actually may occur if the improvements included in the Modal Alternative were actually implemented.

The HST Alternative would reduce long-term impacts on freeways and airports by diverting intercity automobile and airplane trips to the HST system. Like the Modal Alternative, it is possible that the HST system could attract additional (induced) trips to the roadway and airports not accounted for in the Modal Alternative's highway and airport demand.

In addition to improving highway capacity by reducing traffic and reducing demand for trips to the airport, the HST Alternative would eliminate traffic delays at existing at-grade crossings along the Caltrain corridor in the Bay Area and at other select crossings throughout the state. This reduction in delay was measured by estimating the daily vehicle delay savings (i.e., the reduction in the number of hours spent sitting waiting at grade crossings) that would be achieved through grade separation at six sample crossings along the Caltrain shared-use corridor. The four- and six-lane arterial streets were projected to have average daily traffic (ADT) ranging from about 15,000 to 40,000 vehicles in 2020. Grade separations proposed for the HST Alternative resulted in a delay savings from about 10 vehicle hours per day at the lowest volumes to almost 200 vehicle hours per day at the highest volumes. The grade separations would also improve the reliability of both the vehicle trips crossing the HST corridors and the existing commuter conventional intercity rail and freight trips within the corridors.

Overall, as summarized in Table 3.1-4, although highway conditions would improve under the Modal and HST Alternatives, the general conditions would remain at poor LOS with V/C ratios of more than 1.0 on average for each of the five regions. As discussed above, the conditions shown in the evaluation may not always reflect the experiences of travelers at any particular place at any specific time. For example, localized capacity restrictions (e.g., bottlenecks at a given interchange) are not well represented in regional traffic models. In addition, incidents on the road, such as accidents and vehicle breakdowns, are not represented in the regional traffic models. These non-recurring incidents are unpredictable and are responsible for the majority of congestion on urban highway networks.

Goods movement and transit have some minor regional or local impacts; however, on a statewide basis, the potential effects of the Modal and HST Alternatives would be negligible. Planning provisions were made for parking at airports and station areas under the Modal and HST Alternatives respectively; consequently, there should be little effect on the existing parking supplies.

3.1.4 Comparison of Alternatives by Region

This section summarizes key findings comparing the Modal and HST Alternatives to the No Project Alternative, and to each other by region, based on traffic, circulation, and parking. For detailed summary tables associated with this analysis, see Appendix 3.1-A.

A. BAY AREA TO MERCED

Modal Alternative

Intercity Highway Segments: The number of segments operating at LOS F would decrease from 12 under the No Project Alternative to 7 under the Modal Alternative, and the V/C ratios along these segments would improve by 15% on average (Table 3.1-5). The most substantial improvement compared to the No Project Alternative would occur along SR-152 between I-5 and SR-99, where the LOS would improve from LOS F to LOS A, and the V/C ratio would decrease by 50%, from 1.21 to 0.60.

Table 3.1-5
Segments Operating at LOS F (V/C Higher than 1.0)
Bay Area to Merced

Alternative	Number of Segments	V/C % Change
No Project[a]	12	6%
Modal[b]	7	-15%
HST[b]	11	-4.7%

[a] Compared to existing conditions.
[b] Compared to No Project Alternative.
Source: Parsons Brinckerhoff 2003.

Proposed High-Speed Train Stations: The LOS and V/C ratios in the vicinity of the 15 proposed HST station areas are not projected to change under the Modal Alternative compared to the No Project Alternative. As noted in the *Existing Conditions Compared to No Project Alternative* section above, traffic and circulation in proposed HST station areas are analyzed for the Modal Alternative, but the stations would be implemented only under the HST Alternative.

Airports: It was assumed that capacity improvements would be made at OAK and SJC under the Modal Alternative. Freeway links and access roads accessing SJC are estimated to improve from LOS F to LOS E compared to the No Project Alternative because of the proposed capacity improvements in the area.

Transit, Goods Movement, and Parking: The Modal Alternative is not projected to have any potential impact on public transit conditions compared to the No Project Alternative because there are no planned increases in transit services under the Modal Alternative. The Modal Alternative is projected to improve goods movement compared to the No Project and HST Alternatives because the proposed highway capacity improvements would reduce congestion and improve truck travel times.

In general, the Modal Alternative would not affect parking near proposed station and airport areas, and it is assumed there would be no change compared to the No Project Alternative.

High-Speed Train Alternative

Intercity Highway Segments: The number of segments operating at LOS F would decrease from 12 under the No Project Alternative to 11 under the HST Alternative, and the V/C ratios along the

segments would improve by approximately 5% on average (Table 3.1-5). The most substantial improvement under the HST Alternative compared to the No Project Alternative would occur along US-101 between San Francisco and SFO, where the LOS would improve from LOS F to LOS C, and the V/C ratio would decrease by 33%, from 1.06 to 0.71. This significant improvement would result from the additional lane capacity from diversion of automobile trips to HST and the reduction in trips to SFO during the peak period because of the diversion of air travelers to the HST system.

Proposed High-Speed Train Stations: The only significant projected degradation under the HST Alternative compared to the No Project Alternative would occur at the proposed Transbay Terminal, where the LOS would degrade from LOS D to LOS F, and the V/C ratio would increase from 0.89 to 1.01 because substantially more trips would be attracted to the facility.

Airports: LOS on freeway links accessing SFO would improve from LOS F to LOS E under the HST Alternative compared to the No Project Alternative because air travelers would be diverted to the HST system.

Transit, Goods Movement, and Parking: The HST Alternative is not projected to have any potential impact on public transit conditions compared to the No Project Alternative. The HST Alternative is not projected to have any impact on goods movement. Assuming that the HST Alternative would provide parking at all station areas except in downtown San Francisco and Oakland, parking conditions under the HST Alternative would be similar to those under the No Project and Modal Alternatives.

High-Speed Train Alignment Option Comparison

The two Pacheco Pass alignment options listed below would affect US-101 traffic south of San Jose.

- Morgan Hill/Caltrain/Pacheco Pass alignment.
- Caltrain/Gilroy/Pacheco Pass alignment.

The single option below would affect I-880 traffic north of Fremont/Newark.

- Hayward alignment/I-880.

If the Gilroy bypass option were implemented instead of the Gilroy option, a station is proposed in Morgan Hill instead of Gilroy, with the result that some Gilroy traffic would have to travel north on US-101 to reach the Morgan Hill Station. This outcome would increase traffic on US-101 in Gilroy by about 4%, lowering speeds by less than 1 mph (1.6 kph). The LOS on US-101 would remain LOS B in the morning peak direction, and LOS A in the morning off-peak direction.

If one of the Diablo Range Direct alignment options were implemented, there would be no stations at Los Banos, Gilroy, or Morgan Hill. Traffic in Gilroy would be the same as under the Gilroy bypass option. Traffic on US-101 south of SR-85 would increase by approximately 1% with no change in LOS.

If the Hayward/Niles/Mulford Line option were implemented and the Auto Mall Station were chosen instead of the Union City Station, traffic would increase by approximately 2% on I-880 north of SR-4 with no change in LOS.

Traffic impacts would be more severe in the potential Transbay Terminal area than in the 4th and King Street Station area. This difference would be partly caused by the congestion levels

anticipated for all streets near the Transbay Terminal. In contrast, the major effects at 4th and King Streets would be concentrated on King Street. The impact at the Transbay Terminal may potentially be counteracted by high usage of transit in the downtown San Francisco area.

B. SACRAMENTO TO BAKERSFIELD

Modal Alternative

Intercity Highway Segments: The number of segments operating at LOS F would decrease from seven under the No Project Alternative to two under the Modal Alternative, and the V/C ratios along these segments would improve by 34% on average, as shown in Table 3.1-6. This region would experience the largest change in LOS because it has the lowest volume of demand per lane mile compared to the other regions. The most substantial improvement compared to the No Project Alternative would occur along SR-99 between Collier Road and Liberty Road, where the LOS would improve from LOS F to LOS A, and the V/C ratio would decrease by 42%, from 1.01 to 0.58.

Table 3.1-6
Segments Operating at LOS F (V/C Higher than 1.0)
Sacramento to Bakersfield

Alternative	Number of Segments	V/C % Change
No Project[a]	7	51%
Modal[b]	2	-34%
HST[b]	7	-1.5%

[a] Compared to existing conditions.
[b] Compared to No Project Alternative.
Source: Parsons Brinckerhoff 2003.

Proposed High-Speed Train Stations: The LOS and V/C ratios at the 14 proposed HST station areas in the region are not projected to change under the Modal Alternative compared to the No Project Alternative.

Airports: It was assumed that capacity improvements would be made at Sacramento, Fresno, and Bakersfield airports under the Modal Alternative. There would be no significant change in the LOS or V/C ratios within the airport areas compared to the No Project Alternative.

Transit, Goods Movement, and Parking: The Modal Alternative is not expected to have any substantial potential impact on transit services compared to the No Project Alternative. The Modal Alternative could have a positive effect on goods movement due to the improvements in LOS. The Modal Alternative would not generally affect parking near proposed station and airport areas, and it is assumed there would be no change compared to the No Project Alternative.

High-Speed Train Alternative

Intercity Highway Segments: Under the HST Alternative, there would be no change in the number and location of segments operating at LOS F compared to the No Project Alternative. However, there would be an approximate 2% improvement in V/C ratios on average (Table 3.1-6). The most substantial V/C ratio improvement (13%) would occur on I-5 between SR-165 and the Merced/Fresno County line. The LOS along this segment would remain LOS A.

Proposed High-Speed Train Stations: The LOS and V/C ratios at the 14 proposed HST station areas are not projected to change under the HST Alternative compared to the No Project Alternative.

Airports: Compared to the No Project Alternative, the HST Alternative would improve traffic conditions at SMF from LOS D to LOS B and would reduce the V/C ratio by 28%, from 0.88 to 0.63. Although the HST Alternative would improve conditions near the Bakersfield airport from a V/C ratio of 1.09 to 1.05, this improvement would not be substantial enough to improve service to LOS E or better.

Transit, Goods Movement, and Parking: The HST Alternative is not expected to have any substantial impact on transit services compared to the No Project Alternative.

Considering all alignment options where HST tracks are proposed to be at grade and adjacent to existing freight and passenger tracks, as many as 258 locations would be grade-separated from roadway traffic under the HST Alternative. Each of these grade separations would reduce conflicts between rail and highway traffic, thereby improving the efficiency and safety of both modes. The exact number of locations at which crossing roadways would be grade-separated from rail tracks would depend on the final specific HST alignments chosen for the region.

The HST Alternative would be planned to provide an adequate supply of parking at HST stations**;** therefore, compared to the No Project Alternative, no parking impacts are expected under the HST Alternative.

High-Speed Train Alignment Option Comparison

The major alignment and station options in this region are alternative station locations.

- In Sacramento, a station in downtown Sacramento or on Power Inn Road.
- In Modesto, a station in downtown Modesto or on Briggsmore.
- In Merced, a station at the municipal airport, in downtown Merced, or at Castle Air Force Base (AFB).
- In Bakersfield, a station at the airport, on Golden State, or on Truxtun.

Because of relatively low volumes of demand, the choice of stations would cause no significant differences in aggregate roadway LOS between the HST Alternative and the No Project Alternative. There would be no change in the LOS in all instances, although the V/C ratio may be slightly higher under the HST Alternative.

With respect to transit, the Power Inn Road and Bakersfield Airport Station options would require the addition of transit services. Direct connection to Amtrak service would be available only at the downtown Sacramento, Briggsmore, downtown Merced, and Truxtun Stations.

As noted above with respect to goods movement, the proposed HST system would not affect future goods movement and consequently it is not possible at this level of analysis to distinguish between the design options. With respect to parking, the only significant difference among station options would occur in Sacramento, where the Power Inn Road option would require 1,200 (or 69%) more new parking spaces than the downtown Sacramento option.

C. BAKERSFIELD TO LOS ANGELES

Modal Alternative

Intercity Highway Segments: Under the Modal Alternative, there would be no change in the number and location of segments operating at LOS F compared to the No Project Alternative. However, V/C ratios along these LOS F segments would improve an average of approximately 17%, as shown in Table 3.1-7. The most substantial improvement in V/C ratio compared to the No Project Alternative (27%) would occur on I-5 near Burbank; however, the LOS along this segment would remain LOS F.

Table 3.1-7
Segments Operating at LOS F (V/C Higher than 1.0)
Bakersfield to Los Angeles

Alternative	Number of Segments	V/C % Change
No Project[a]	7	73%
Modal[b]	7	-17%
HST[b]	7	0.7%

[a] Compared to existing conditions.
[b] Compared to No Project Alternative.
Source: Parsons Brinckerhoff 2003.

Proposed High-Speed Train Stations: All five of the proposed HST station areas would remain LOS F under the Modal Alternative, and there would be no significant change in V/C ratios compared to the No Project Alternative.

Airports: It was assumed that additional runway and gate capacity improvements would be made at BUR under the Modal Alternative. Although the demand of the Modal Alternative would result in increased traffic in and around BUR, the V/C ratio would decrease by 14% because of planned highway improvements that will be implemented under the No Project Alternative.

Transit, Goods Movement, and Parking: The Modal Alternative is not expected to have significant impacts on public transit, goods movement, or parking compared to the No Project Alternative.

High-Speed Train Alternative

Intercity Highway Segments: Under the HST Alternative, there would be no change in the number and location of segments operating at LOS F compared to the No Project Alternative, and there would be no significant change in V/C ratios.

Proposed High-Speed Train Stations: Within each of the five proposed station areas, there would be an increase in traffic. V/C ratios would increase compared to the No Project Alternative by an average of about 4%, and level of service would remain LOS F. The most substantial impact would occur at the Burbank Downtown Station, where the V/C ratio would increase by 7%.

Airports: The HST Alternative would cause no significant change in the levels of service or V/C ratios in the Burbank airport area, compared to No Project.

Transit, Goods Movement, and Parking: The HST Alternative is expected to improve goods movement by grade separating many Metrolink and freight crossings that would be at grade under the No Project Alternative. This outcome would positively affect both train operations that use the grade separation and bus operations that are currently delayed at grade crossings.

Under the HST Alternative, the impact on parking at the Palmdale Station is assumed to be low because land is available for creating parking facilities in the immediate vicinity of the proposed station. The impacts on parking at Sylmar and Burbank Downtown Stations are rated medium because these locations are currently stations on the existing Metrolink commuter rail system, and there is some potential for parking to spill over from the HST into the existing parking lots. It is assumed that parking sufficient to meet the forecast HST ridership demand would be provided in new or expanded parking structures at both locations. The impact on parking is rated low at LAUS because major multilevel parking structures would be constructed in downtown Los Angeles to accommodate the HST parking demand in conjunction with station development.

High-Speed Train Alignment Option Comparison

The Bakersfield to Sylmar HST alignment options that roughly follow I-5 and SR-58 are the two principal alignment options in this region. If the SR-58/Soledad Canyon option were chosen, there would be a station in Palmdale. In Palmdale, the SR-58/Soledad Canyon HST option would only slightly increase the aggregate V/C ratio (from 1.20 to 1.22) in the study area, primarily on roads that provide direct access to the station. If the I-5 option were chosen, there would not be a station in Palmdale. Traffic analyses that incorporate the I-5 and SR-58 alignments show no significant difference between the two options.

Other design options are listed below.

- In Burbank, a station at Burbank airport or a station in downtown Burbank.
- Near LAUS, a station south of LAUS above the Los Angeles River or a station on the east bank of the Los Angeles River.

In Burbank, most of the roadways providing access to the alternative station areas are forecast to operate above capacity (i.e., LOS F) with or without the HST Alternative. For the airport option, the HST Alternative would increase the aggregate roadway V/C ratio by 2%; for the downtown option, the projected increase would be 7%. An airport station would provide better access to air service; a downtown Burbank station would be located closer to the midpoint between Sylmar and LAUS and would provide better access to Metrolink commuter trains.

At LAUS, either design option would include new parking on both sides of the Los Angeles River and would require a people-mover link to LAUS. The southern option would increase traffic on already congested (LOS F) Alameda Street, whereas the east bank option would add traffic to Mission Road, which is not a primary access street for the station currently and would need widening and upgrading.

D. LOS ANGELES TO SAN DIEGO VIA INLAND EMPIRE

Modal Alternative

Intercity Highway Segments: Under the Modal Alternative, only the I-15 segment between Temecula and Escondido would show an improvement in LOS, from LOS F to LOS E, compared to the No Project Alternative. As shown in Table 3.1-8, the average V/C improvement would be approximately 17%. The potentially most substantial improvement compared to the No Project Alternative would occur along I-215 between I-15 and Temecula, where the V/C ratio would decrease by 33% and the LOS would improve from LOS C to LOS A.

Table 3.1-8
Segments Operating at LOS F (V/C Higher than 1.0)
Los Angeles to San Diego via Inland Empire

Alternative	Number of Segments	V/C % Change
No Project[a]	11	43%
Modal[b]	10	-17.4%
HST[b]	10	-7.2%

[a] Compared to existing conditions.
[b] Compared to No Project Alternative.
Source: Parsons Brinckerhoff 2003.

Proposed High-Speed Train Stations: No changes in traffic conditions around HST stations are expected to occur under the Modal Alternative compared to the No Project Alternative.

Airports: Under the Modal Alternative, capacity improvements are planned at the San Diego airport and Ontario. Compared to the No Project Alternative, the level of service at San Diego airport street screenlines is expected to deteriorate as follows: Archibald (LOS B to LOS F), Pacific Highway (LOS A to LOS F), Laurel Street (LOS E to LOS F), Hawthorn Street (LOS D to LOS F), and North Harbor Drive (LOS A to LOS B). There are no significant impacts expected in the area of the Ontario airport.

Transit, Goods Movement, and Parking: There is little differentiation in potential transit and goods movement impacts between the No Project, Modal, and HST Alternatives. The Modal Alternative would have slightly more impacts on parking at the Ontario and San Diego airports than the HST or No Project Alternatives.

High-Speed Train Alternative
Intercity Highway Segments: Overall, the HST Alternative would improve V/C ratios by an average of approximately 7% compared to the No Project Alternative. As under the Modal Alternative, only the I-15 segment between Temecula and Escondido would show an improvement in LOS (from LOS F to LOS E) compared to the No Project Alternative. This segment would also potentially show the most substantial change in V/C ratio: a 19% improvement, from 1.16 to 0.94.

Proposed High-Speed Train Stations: Compared to the No Project Alternative, traffic conditions around the 17 proposed HST stations would potentially deteriorate as follows: South El Monte (LOS B to LOS C), Qualcomm (LOS B to LOS C), Escondido Transit Center (LOS D to LOS E) and San Diego International Airport (LOS C to LOS E).

Airports: Compared to the No Project Alternative, the HST Alternative would cause no significant change in levels of service or V/C ratios in the airport areas.

Transit, Goods Movement, and Parking: There is little differentiation in potential impacts between transit, goods movement, and parking between the No-Project, Modal, and HST Alternatives.

In the proposed HST station areas, the potential for conflict between feeder buses and private vehicles was considered. Where there are more bus routes, there is increased potential for conflicts between personal vehicles and buses. However, multiple bus routes serving a station benefit train riders by providing multiple opportunities for local circulation and distribution

without private vehicles. The number of bus routes would be high at the Mira Mesa (28 routes) and Downtown San Diego (33 routes) Stations; the Temecula, Escondido Rock Springs, and Qualcomm Stations would have a low number of bus routes—6 or fewer. The other 12 stations would have a medium (between 6 and 28) number of bus routes. However, the HST Alternative overall would not have transit impacts beyond those of the Modal and No Project Alternatives.

High-Speed Alignment Options Comparison
These are the major alignment and station options compared in this section.

- San Bernardino loop compared to San Bernardino downtown bypasses.
- Carroll Canyon option compared to Miramar Road option.
- Qualcomm terminus compared to downtown terminus.

The San Bernardino loop would provide service to a major intermodal transfer location at the Santa Fe Depot as well as better regional coverage for northern Riverside and San Bernardino Counties. This benefit would need to be evaluated, taking into account the 4-to 8-minute delay incurred by routing trains to a station in San Bernardino. The Carroll Canyon alignment in San Diego County would represent a new transportation corridor, in contrast to the Miramar Road alignment, which has heavy congestion and space limitations. In San Diego, the Qualcomm terminus would potentially provide easier access, parking, and station location opportunities than the downtown terminus, but would not serve the central business district core without requiring an additional transfer to light rail and necessitating additional travel time.

E. LOS ANGELES TO SAN DIEGO VIA ORANGE COUNTY

Modal Alternative
Intercity Highway Segments: The number of segments operating at LOS F would decrease from eight under the No Project Alternative to five under the Modal Alternative. As shown in Table 3.1-9, the average V/C ratio would improve by approximately 14%. The potentially most substantial improvement compared to the No Project Alternative would occur along I-105 at Inglewood Avenue, where the LOS would remain LOS F, but the V/C ratio would decrease by 21%, from 1.98 to 1.57.

Table 3.1-9
Segments Operating at LOS F (V/C Higher than 1.0)
Los Angeles to San Diego via Orange County (LOSSAN)

Alternative	Number of Segments at LOS F	V/C % Change
No Project[a]	8	19%
Modal[b]	5	-14.4%
HST[b]	6	-3.0%

[a] Compared to existing conditions.
[b] Compared to No Project Alternative.
Source: Parsons Brinckerhoff 2003.

Proposed High-Speed Train Stations: Compared to the No Project Alternative, the Modal Alternative would not change traffic conditions around the proposed HST stations, except at the LAX Terminal Station. Under the Modal Alternative, the V/C ratio at the LAX Terminal Station would increase by 6%, and the LOS would degrade from LOS E to LOS F compared to the No Project Alternative.

Airports: Planned capacity improvements would occur at John Wayne International-Orange County Airport and Long Beach Municipal Daugherty Field under the Modal Alternative. Near LAX, the aggregate LOS on roadway links to the terminal would worsen from LOS E to LOS F, and the V/C ratio would worsen from 0.97 to 1.03 compared to the No Project Alternative. Near LGB, the aggregate LOS on roadway links to the terminal would worsen from LOS A to LOS B, and the V/C ratio would worsen from 0.59 to 0.64 compared to the No Project Alternative. These airport roadway links are projected to worsen under the Modal Alternative because peak-period traffic accessing the airports would increase.

Transit, Goods Movement, and Parking: The Modal Alternative would have no significant impacts on transit compared to the No Project Alternative. Planned increases in bus and commuter rail service are expected to meet demand for transit. Also, the Modal Alternative is not expected to have any significant impact on goods movement compared to the No Project Alternative.

Except at the proposed Norwalk (which is a new station and does not have any parking associated with the location yet) and San Juan Capistrano (which is constrained by many historic properties surrounding the station site) Stations, parking capacity at each station is projected to meet the demand of travelers under the Modal Alternative; there would be no significant change compared to the No Project Alternative.

High-Speed Train Alternative

Intercity Highway Segments: Under the HST Alternative, traffic congestion is projected to improve slightly on the intercity highway segments compared to the No Project Alternative. The most significant changes would occur on I-5 at Balboa Avenue and on I-5 at Tamarack Avenue, where the LOS would improve from LOS F to LOS E and from LOS D to LOS C, respectively. The average regional V/C ratio would improve by 3%.

Proposed High-Speed Train Stations: The HST Alternative would cause no significant changes in LOS or V/C ratios within the station areas compared to the No Project Alternative, except at the proposed San Juan Capistrano Station, where the LOS would degrade from LOS E to LOS F.

Airports: The HST Alternative would cause no significant changes in LOS or V/C ratios in the LAX and Long Beach Municipal Daugherty Field areas compared to the No Project Alternative.

Transit, Goods Movement, and Parking: The HST Alternative would cause no significant impacts on public transportation or goods movement compared to the No Project Alternative.

Except at the proposed Norwalk and San Juan Capistrano Stations, parking capacity at each station is projected to meet the demand of travelers under the HST Alternative; there would be no significant change compared to the No Project Alternative. Under the HST Alternative, potential parking impacts could occur at the Norwalk and San Juan Capistrano Stations because available land around the HST station areas is lacking, and at San Juan Capistrano the proximity of the station to historical buildings and resources constrains parking options.

High-Speed Train Alignment Option Comparison

Only the LOSSAN segment has an alternative alignment that presents significant differences in transportation impacts. One alignment option involves using the existing LOSSAN passenger rail corridor; the other option involves using the Union Pacific Railroad's (UPRR's) Santa Ana subdivision right-of-way.

The existing LOSSAN corridor option would allow for the use of an existing right-of-way from Los Angeles to Irvine in Orange County. This option would have fewer impacts on existing freight rail

services in Orange County because the service could continue operations on the corridor while the HST was being constructed. This option also would allow use of an existing higher-speed rail infrastructure, further minimizing the traffic and circulation impacts in the cities traversed by the alignment. Between Los Angeles and Fullerton, this corridor represents the Burlington Northern Santa Fe Railroad's (BNSF's) primary freight line out of the Los Angeles Metropolitan Area. This option would involve using four tracks: two dedicated to passenger service and two to freight.

The UPRR Santa Ana Branch Line option would also allow for a dedicated HST alignment that uses an existing railroad right-of-way for most of the distance between Los Angeles and Anaheim in Orange County. However, this option would present a high impact on the existing local freight service on the Santa Ana Branch Line, which is estimated to be between two and four hauler trains per day. Although this service does not represent heavy traffic, these trains typically operate at about 10 mph (16 kph) and spend long periods on the track. It is assumed that this service would have to be removed from the line because of the limited existing right-of-way. Potential benefits associated with the HST Alternative include the full grade separation of major arterial and highway crossings (see Appendix 3.1-B). There are 78 at-grade crossings between Los Angeles and San Diego. South of either Anaheim or Irvine, high-end and low-end build options are available. Of the 78 grade separations, 61 would occur between Anaheim and San Diego (on the LOSSAN corridor option). Seventeen of the 78 would occur between Anaheim and Los Angeles; of those, 11 would be on the LOSSAN corridor option and 6 would be on the UPRR Santa Ana Branch option. In concurrence with the improvements within this corridor being studied by Caltrans, the high-build option would involve full grade separation of every grade crossing along the existing LOSSAN corridor south of the HST termination point. The low-build option focuses primarily on safety improvements to the existing grade crossings and a new grade separation at Chesterfield Drive in Encinitas. The low-build option would also possibly involve realigning the rail corridor in various locations to eliminate the existing grade crossings.

3.1.5 Mitigation Strategies

Currently, regional planning agencies and the counties and cities in the regions have considerable flexibility to deal with identified traffic, transit, and parking impacts. The California High Speed Rail Authority could participate in developing potential construction and operational mitigation measures in consultation with state, federal, regional, and local governments and affected transit agencies during project-level reviews.

Potential mitigation measures could be developed to improve the flow of intercity travel on the primary routes and access to the proposed stations or airports. These improvements would be based on the forecast capacity deficiencies identified for the No Project, Modal, and HST Alternatives and could possibly employ some of the following approaches.

- Transportation System Management (TSM)/Signal Optimization (including retiming, rephrasing, and signal optimization); other measures may include turn prohibitions, use of one-way streets, and traffic diversion to alternate routes.
- Local spot widening of curves that allows for geometric improvements without significant right-of-way acquisition.
- Major intersection improvements (full lane widening), which require significant right-of-way acquisition to accommodate additional left-turn and/or through lanes.

V/C ratios on the major intercity routes identified in the system screenline analysis show the desirability of more capacity on several freeway segments under all alternatives. When considering measures for traffic mitigation, the increase in automobile congestion and lowered vehicle flows that would be caused by the HST Alternative would be studied at the project-level analysis in the context of providing a new

form of transportation (HST) and would consider total passenger flow versus vehicle flow in the study area if the HST alternative is selected. Further, the people-carrying capacity of the HST Alternative would be considerably higher than the capacity of the potentially feasible lane additions described in the Modal Alternative, allowing it to more easily absorb trip growth.

Consultation and coordination with public transit services in order to encourage the provision of adequate bus feeder routes to serve proposed station areas could mitigate potential transit impacts.

3.1.6 Subsequent Analysis

If the HST Alternative is selected, subsequent multimodal access and circulation studies could be conducted at proposed station areas along proposed alignments as plans for alignments, stations, and operations are refined. Additional environmental analysis would be required in conjunction with these studies to ascertain the exact locations of potential project-generated traffic impacts and potential parking demand impacts. Station area circulation studies would be expected as part of project-level environmental documentation.